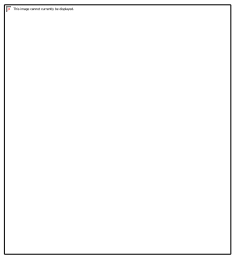

THE USE OF INFORMATION COMMIUNICATION TECHNOLOGY (ICT) IN HEALTH CARE: FINLAND VS ETHIOPIA

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Laurea University of Applied Sciences Abstract

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Different countries have adopted and integrated Information communication technology (ICT) into their Healthcare sectors at different rates. It is apparent this is the way into improved healthcare currently and in the years to come. This research paper is derived from a previous thesis that was done in 2012 which took a case study approach to identifying issues in ICT development in Ethiopia. And now using a combination of primary and secondary sources, including previous analyses, government and NGO reports, books and published materials by policymakers in Ethiopia and Finland.

Purpose of the paper was to describe the state of ICT use in health care in Finland and Ethiopia. To define and identify challenges to effective ICT implementation in health care. The theoretical part of this paper discuss about the driving factors to adopt ICT in health care. Moreover the delivery of health care in the two country is discussed. The research also examined the current state of ICT in health care implementation, barriers and challenges. The findings were then used to compare where these two countries are in their ICT implementation and how they are utilizing ICT in their health care sectors. The result indicate that Finland has an excellent ICT implementation and utilization in health care and other sectors whereas Ethiopia still lags behind due to number of reasons. Finally, there is the conclusion section that gives a recap of the main ideas appraised in the paper.

Keywords: Health care, ICT, Finland , Ethiopia

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Dedicated to my beloved mom Haregeweyn Kebbede

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LIST OF ACRONYMS AND SYMBOLS

$ The United States dollar (currency code: USD) official currency of the United States of America

€ The euro (currency code: EUR) official currency of the Euro zone

EPR Electronic patient records

FMOH Federal Ministry of Health

GOE Government of Ethiopia

ICT Information Communication Technology

NGO: Non-Government Organization

NRI Networked Readiness Index

OECD Organization for Economic Cooperation and Development

PKI Public Key Infrastructure

THL Terveydenjahyvinvoinninlaitos (The National Institute for Health and Welfare of Finland)

WHO World Health Organization

1 Introduction

The recent past years have been characterized by an ever-evolving world and in which notable areas has been the robust in changing technology. The development of electronic computers in the 1950s and eventual emergence of the commercial internet provision in the late 1980s created a platform for major developments and innovations in the information and communication technology (ICT) industry. ICT denotes the aspect of integrating the processing of information, computing, as well as communication technologies (Wang, 2013, p. 6). This has transformed the ways in which people learn, work, and live in the society by bringing about major changes in different contextual settings such as the healthcare, education, and in the social live among others (Morley, 2014, p. 295). Further Morly (2014) agreed that the use of robotics and personal computers has largely influenced the overall operations in the healthcare industry. This forms the basis of this paper, which seeks to undertake a critical analysis of the ICT on health care with focus on Finland and Ethiopia. The paper covers the theoretical background of ICT from a general outlook perspective and eventually narrows down to its use in the two countries. In so doing, there will be analysis of the current status of ICT use in Finland and Ethiopia as well as the future outlook in the two countries.

2 Theoretical background of the use of ICT in general

2.1 Overview

There has been a widespread use of information and communication technologies in the healthcare sector as evidenced by the increasing use of computers in hospitals all across the world. Even as more research, with regard to the integration of the ICT in healthcare, is made, the current levels of advancements in the healthcare industry have helped improve the patients' level of experience and especially considering the fact that the primary idea of increasing the use of computers in the hospitals was to improve efficiency. An important point to note is that new transformative trends have been experienced both in the developed and developing countries. These have consequently led to a general improvement in the healthcare outcome and especially at this time when the number of chronic and long-term diseases has been increasing (Marie-Pierre Gagnon, and José Côté 2015.)

2.2 The Drivers behind integrating ICT in Healthcare

The driving force behind the use of ICT in the healthcare sector can be attributed to various factors. Governments of the world have started realizing the importance of the increased levels of efficiency brought by the ever evolving technologies (Charles A. Shoniregun, Kudakwashe Dube and Fredrick Mtenzi 2010 p-110.)

As a result, governments and other healthcare stakeholders have responded by critically emphasizing the need to restructure the healthcare infrastructure with the aim of keeping track with the changing rate of technological advancement. Additionally, it has become impossible to oppose the

technological changes that are taking place in this digital era. Eventually the trend leaves hospitals with no other alternative other than following suit. Nevertheless, the primary objective of every health care provider is to deliver quality services. Technology has been considered as an approach through which hospitals can achieve the optimal levels of required efficiency. For instance, it is one of the ways through which hospitals have been able to reduce operational costs and make healthcare provision more affordable to the population (Charles A. et al 2010.)

2.3 Challenges in integrating ICT in Healthcare

There have been potential challenges that have been experienced as hospitals from different countries try to implement and integrate ICT in their systems. The integration has not been realized uniformly considering that some of the countries are still in their developmental stages. Some of the developing countries have adopted ICT into their healthcare system unlike the developed nations (Maria, 2013, p. 640). Additionally, the cost of implementing ICT is relatively high and some of the healthcare facilities have found it challenging to implement (Maria, 2013, p. 640.) Nevertheless, the lack of knowledge with regard to the use of some of these ICT systems has also been a major drawback towards their integration (Maria, 2013, p. 640).

2.4 Realized Benefits for Integrating ICT into Healthcare

The continued integration and adoption of ICT in the healthcare sector has brought about major, ground-breaking, and monumental benefits (Paula Ranta 2010 P.15).

The increased use of ICT in hospitals has helped improved the knowledge levels of the patients (Goel, 2014, p. 439). This is because through the use of the computers, the patients have a chance of grasping the visual perspective of the health status, for instance X-rays, radiographs, and a range of other visual image representations. The systems being used in the modern hospitals have

helped advance the recording, analysis, and understanding of different patients' information. Another key point is that besides the visual image representations, the patients can inform themselves on their health through the information they gather from the internet, which is again as a result of the advancing ICT sector (Goel, 2014, p. 439.)

Secondly, through the use of ICT in the healthcare sector, hospitals have been able to reduce their operational and other associated costs (Burney, et al 2010, p. 29). The increased computerization of the healthcare sector has ensured that hospitals are moving away from paper work to electronic systems, which has helped bring down the operational costs. For instance, the particular healthcare practitioner does not have to print out appointment information, patient booking information, test information, and test results among others. He saves the amount of papers being used, time, and money. Also, the fact that most of the communication is conducted online, means that the patients' physical visits to the healthcare facilities is reduced, also saving on transportation and other indirect costs that could be incurred during such visits Burney, et al 2010, p. 29.)

Thirdly, there is improved level of patients' safety and outcome (Rodrigues, 2014, p. 222.) The use of emails, as opposed to paper work, makes it relatively easier to send and access a patient's information (Guah, 2011, p. 80). Furthermore, the use of the electronic media has improved the aspect of progressively updating the patients about their medical information (Guah, 2011 p.80.) The continued use of computers has led to the integration of the quality assurance programs, which are vital in ensuring that the programs in use are functional and in good state thus helping avert unnecessary medical errors (Rodrigues, 2014, p. 222). Moreover, the ICT integrated systems are critical to patients' data collection, diagnosis, and clinical protocols. As such, the above coupled with the ability to keep track of the patients' progress and reduction of medical errors have gone a long way in holistically improving the level and quality of healthcare outcome and patients' safety (Rodrigues, 2014, p. 222.)

Fourthly, there is improved financial management and efficiency in the hospitals (Goel, 2014, p. 439). The Accounting and Financial departments in many healthcare facilities are now using computer programs and software such as Quick-books and Excel in running their financial operations. Through the use of well integrated financial management systems, the hospital departments are better placed as regards the calculation of patient's expenses, employees' salaries, pay-checks,

and respective taxes. Nevertheless, the systems have also been used in maintaining the financial records as regards the hospital bills that a particular health facility is required to pay. As compared to paper work, the adoption of these systems has thus helped in the aversion of different financial errors and hence brings down issues of corruption and financial theft in different facilities (Goel, 2014, p. 439.)

Fifthly, the integration of ICT in hospitals has helped promote research, which is very critical in the health care sector (Goel, 2014, p. 439). The ICT has helped promote the concept of a united global community whereby people from all over the world can be virtually linked through the internet. For instance, through the use of the internet, doctors and other medical practitioners can share information on a prevailing medical crisis, advance primary research on the same, as well as utilize the prevailing data to analyse and come up with appropriate solutions as regards the issue (Goel, 2014, p. 439.)

Finally, the use of ICT has helped conserve the environment. The reduction of waste paper disposal has helped the world “go green” through the use of the ICT systems. Eventually, this has seen the improvement on the global environmental conservation and consequential reduction in the global warming, which is increasingly becoming a global threat (IGI Global, and Information Resources Management Association, 2015, p. 75.)

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3 Healthcare Status in Finland and Ethiopia

3.1 Overview of General Healthcare in the Two Countries

According to NATO Advanced Research Workshop on Benchmarking Telemedicine Improving Health Security in the Balkans, and Carla Sydney Stone (2017, p. 25), Finland has been able to reinvent and develop its healthcare system over the last century and it is still making huge progress towards the future. Based on Carla Sydney Stone (2017) assessment he country's healthcare, in many aspects, is a state-of-the-art among the OECD countries. The accessibility, scope, and the quality of healthcare services provided in the country have progressively been developing over the last few decades. This has been characterized by the progressive changes in the structure and content of the social welfare as well as the healthcare services (Carla Sydney Stone 2017, p. 25.) The Ethiopian healthcare status lags behind, on the basis of the World Health Organization's (WHO) findings (WHO.Int, 2018). According to the organization, the Ethiopian health status is "poor'' even when related to the other low-income countries including those in the sub-Saharan Africa." The major prevalent diseases ailing the country's stable health include potentially prevent-able diseases diarrhoea, tuberculosis, HIV, acute respiratory infections, and malaria among others. However, as noted by Kebede and Francis (2011, p. 128) and as acknowledged by the WHO, the Ethiopian government and other stakeholders have shown commitments with regard to improving healthcare in the country.

3.2 Health Care Delivery in the Two Countries

The Finnish healthcare services are provided by public and private sectors. Finland primarily has two parallel healthcare systems with regard to the provision of the healthcare services. These

include the municipal and the private healthcare systems. There is also the occupational healthcare services, which are also provided by the municipal and private providers but these are governed by separate legislation and have own funding mechanism and hence are considered third care delivery channel (Teperi, Vuorenkoski, MIchael and Barone 2009, p. 47.)

The system is divided into primary and specialized care, which offer both inpatient and outpatient services. Patients are free to seek the services of the private practitioners and the National Health Insurance (NHI) reimburses part of the cost paid out of pocket by the patient (Teperi, et al 2009, p. 51.) However, this only applies to the private licensed medical doctors to assuage issues of quack practitioners. Besides the general practitioner services, those medical doctors in the private practice provide ambulatory services and other types of medical services as long as they are qualified and certified. In special cases, the municipal and district hospitals may hire the services of the private practitioners and this is considered as public delivery system (Teperi et al 2009, p. 48.)
Just like in the case with Finland, the Ethiopian healthcare system has both public and private care delivery. Beside the professional practitioners in the private practice, it is also important to note that there are traditional healers in the country, although according to the World Health Organization (WHO.Int, 2018), it has become relatively challenging to document their numbers. According to the WHO, the private sector accounts for the largest proportion with regard to the available number of drug vendors, pharmacies, and drug shops. It also acknowledges the fact that most of the healthcare centres, and especially the public run, are under staffed. Some of the trained manpower has also been criticized as they are considered to be unsatisfactory. It has also been noted that the access to healthcare services in the rural areas, is very challenging the above, among a range of other factors, speaks to the current relatively poor health status in the country (WHO.Int, 2018.)

3.3 Health Care Financing in the Two Countries

According to Vuorenkoski (2008, p. 1), all three healthcare systems in Finland including municipal, occupational, and private healthcare receive funding from the public. 80% of this funding comes from the general taxation, whose collection lies under the responsibility of the national and local government. The patients can access two different financing mechanisms under the Finnish healthcare system, according to Vuorenkoski (2008, p. 1) and Teperi, et al (2009, p. 43.) These include the statutory National Health Insurance (NHI), which covers all the residents in Finland. There is also the private insurance, which according to Teperi, et al (2009, p. 44) is uncommon. It is mostly used for children and is unavailable for the elderly population. This is explained by the fact; most of the children do not have access to the occupational healthcare, which is the alternative to the municipal system. The NHI is run by the social insurance institution and is divided into two pools including; the income insurance and medical sickness insurance. The availability of NHI ensures that all the Finnish citizens and residents have access to affordable healthcare (Teperi et al 2009.)

On the other hand, the financing of healthcare in Ethiopia is done by the government, insurance, donors, and community contributions (WHO.Int, 2018.) The Ethiopian government accounts for 55% of the total healthcare expenditure (WHO.Int, 2018). The donors contribute 42.5%, and the remaining proportion is covered by the out of pocket fees (WHO.Int, 2018). There is unfair distribution of healthcare funding, with those living in the urban areas having higher allocation per capita relative to their rural counterparts.

4 The Use of ICT in Healthcare: The Case of Finland and Ethiopia

4.1 The Use and Adoption of ICT in Health Care in Both of the Countries

Finland and Ethiopia have been trying to offer quality healthcare to their citizens. However, with reference to the different determinants of healthcare, the two countries are far apart with regard to nature of ICT adoption in hospitals. Finland is more economically advanced than Ethiopia implying that the two cannot be at par as regards income, social status, social support networks, education and literacy, personal health practices, and healthy child development. According to Health Expenditure and Financing – THL (2018), the Finland government's spending on health as at 2015 was EUR 19.8 ($24.75) billion and this has been increasing by 1.2% per year in real terms. This translates to 25047 million US dollars as at 2016 for a total population of 5.5 million. This is as compared to Ethiopia, with a population of over 100 million whose healthcare spending was less than 10 million US dollars at 2016(Federal Ministry of health Ethiopia, 2016.)

Finland has been ranked among the countries that have the strongest health technology economies from a global point of view. This has been stemmed on the long history of its Nokia's long standing reputation as a global top mobile technology supplier (Hanna & Peter 2012.) Nokia was the basis from the end of 1980's and the beginning of the 1990's on which Finland capitalized and leveraged its ICT knowhow and which case this has permeated in almost every sector in the country and digital health technology has been cited as one of the robustly growing and promising field in the country. Hanna and Peter (2012, p. 197-198) point out that Finland ranks amongst the first global countries standing 3rd in the world in setting up a nationwide patient data repository that could cover the private and public healthcare sectors. To this day, all the healthcare organizations have improved online access to their healthcare records as well as their e-prescription history. According to Hanna and Peter (2012, p. 197) Finland is considered home to ICT expertise and advanced medical research. Its health technology is compared others advanced vitro diagnostic and

wearable technologies, imaging equipment, cutting-edge X-ray equipment, and implant technologies.

This is however, different in Ethiopia, which is still a developing country. Although the Ethiopian government has invested largely into the healthcare sector, major gaps still remain with reference to the country's move towards the integration of the ICT into its healthcare sector (Oqubay 2015, p. 24.) For instance, according to Oqubay (2015, p. 24), some of these issues emanate from human capital such as unskilled healthcare and ICT workers, poor infrastructure, insufficient funding, macro-level concerns, uneducated population, and inadequate equipment supply among other challenges. However, despite these challenges, it is important appreciate the fact that the Ethiopian government has begun implementing a significant national telecommunications infrastructure. This has gone a long way in helping the Federal Ministry of Health (FMOH) to optimize its ICT application in improving data exchange in different healthcare facilities as well as in supporting the national cadre of Health Extension Workers and especially in the remote areas(Federal Ministry of Health Ethiopia, 2016).

5 Use of ICT in Finland

5.1 Patients' Information Recording Systems in use Right now in Finland

According to International Congress in Nursing Informatics, Hyeoun-Ae, Peter, and Connie (2006, p. 425), the history of ICT usage in the Finnish healthcare dates back to the 1960s, whereby it was used in the hospitals as support systems in the patient care as well as the management of the nurses. The authors continue to note that the systematic development of ICT use in the Finnish healthcare system kick-started in the mid-1990s after the Ministry of Social Affairs and Health come up with an extensive publication of the ICT strategies in the healthcare sector. During that

time, the use of ICT in hospitals was highly varied, whereby some of the facilities fell short of the electronic patient record systems. Additionally, there was lack of stable and reliable network connectivity and there were separate information systems, eventually making it challenging to manage and run the entire Finish healthcare system (Hyeoun-Ae, et al, 2006, p. 425.) These research findings are backed up by Vainioma, Kuusel, and Rautava 2008 p. 117) sentiments, who after undertaking a research in 2008 established that the primary patient records in the Finnish healthcare systems were of unsatisfactory standards and hence required progressive improvements. However, an imperative point to note is that since then, the Finnish healthcare sector has undergone through robust transformation as regards the electronic patient records (EPR) over the recent years. This translates into major improvements as regards how the patient information recording systems work in the country. It also translates into improved overall care provided to the Finish citizens and residents. This has been achieved through the continuous integration and implementation of the e-health system, commissioned by the Finish Ministry of Social Affairs and Health in order to keep track of the electronic aspects of healthcare management in the country (Hyppönen, et al 2015, p. 3.) Finnish government, under its Social Affairs and Health ministry, have helped it achieve major milestones in improving the documentation of the patients' records. For instance, as at now, it is a requirement that the storage of all the patient documents should be in electronic format and this cut across the private and the public sector, which is an improvement to the findings by the International Congress in Nursing Informatics, Hyeoun-Ae, et al (2006, p. 425), as at 2006. According to Hyppönen, et al (2015, p. 33), it is mandatory for the Finnish healthcare professionals to document all the information regarding patient data in the Patient Data Repository, which is maintained by the Social Insurance Institution of Finland abbreviated as "Kela". Additionally, the Finnish government ensures the use of the Kanta services, which allow the regular viewing and monitoring of all the electronic prescriptions and medical records (Reponen 2015, p. 33.)

5.2 Current Healthcare ICT Infrastructure in Finland

As indicated from the preceding section, the management of the patients' health records is done through the Patient Data Repository system. The Finnish Public Key Infrastructure (PKI) is utilized in the national e-prescription and patient documentation. The PKI incorporates a smart ID card, e-signature, and a very strong authentication for the care providers. There is the integration of the national services alongside other different local electronic patient records systems. Through these improved systems, patients are capable of accessing their personal information by logging into the systems. The above healthcare professional features, among others, have been very critical in the authentication of the identities of the care providers, thereby reducing or totally averting cases of quack doctors and other healthcare professionals.

The above findings are supported by Vuorenkoski (2008, p. 88) who connotes that there have been major landmarks in the Finish technological infrastructure with reference to its healthcare sector. Based on the findings of the author, almost all of the healthcare centres and hospital districts have been using electronic documentation of the patients' information. However, he has criticized the healthcare system in the country on the basis of its decentralization approach, which has eventually made it relatively challenging to coordinate. Consequently, this has led to a situation whereby non-interoperable systems have continued to be used by some of the individual healthcare organizations Vuorenkoski (2008, p. 88). Vuorenkoski also acknowledged, that there has been an ailing issue to the documentation of the Finnish patients' electronic data but is continuously being addressed through the electronic patient record system that was recommended in 2006 by the parliament and in which case has achieved some progress through the established of the above discussed PKI. Vuorenkoski (2008, p. 89) notes that the rate of the general internet utilization has increased over the years, whereby the individual subscriptions in 2008 skyrocketed to more than 700 from 447 out of 1000 people in 2006. There has been the continued use of internet services in homes, places of work, as well as places of study. In view of the above, it follows that patients can now even engage with their doctors online and in real time without necessarily having to physically visit the healthcare facilities, which is a major breakthrough in the collection of patients' information in Finland Vuorenkoski (2008, p. 89.)

5.2.1 The Future of the Finnish Healthcare System

Finland is a very advanced country as regards the use of ICT in its healthcare sector. According to Saba and McCormick (2011, p. 33), the country is the most advanced in the sector relative to the other European countries. Through its "Kanta'' system, there has been an improvement in the e-archiving of the patients' information. However, it has also been established that there are gaps in the system even as the country is undergoing major transformations as regards its social affairs and healthcare system. These progressive transformations are geared towards ensuring that the country achieves the possible optimal outcomes with reference to the patients' data management. The Finnish government has since identified and recognized the significance of adopting a more reliable and consistent ICT systems with reference to the EPR sharing among the care providers, including regional districts, and across the municipalities (Saba and McCormick, 2011, p. 34.)

Based on the current statistics and recent trends in Finland, and with reference to the implementation of ICT in the country's healthcare sector, major projections can be made into the future. Firstly, as regards the gaps the country has put in place appropriate strategies that aim to improve its healthcare ICT infrastructure in order to serve it growing population. For instance, there is the Appotti project whose main objective is to progress a cooperative endeavour in the development of a regional information structure this can be integrated into the social services and healthcare service. Though the initial rolling out of the project is in Finland's most populous city, Helsinki, the program will also be initiated in other health districts in order to ensure that the patient information is captured and documented in electronic systems. The fully implementation of the project is expected to be in 2020 (Int'L Business Publications, 2015, p. 90).

Finland is progressively improving and developing its KanTa program. This is a country-wide electronic archive system of information relating to different patients' health coupled with the Electronic Prescription Program, which has also helped improve patients' data documentation as it is possible to electronically retrieve the medical history of different patients with reference to their

medical status leading to the prescription of particular diseases (Päivi Hamalainen, et al 2008.) GI Global, and Information Resources Management Association (2018, p. 489) also notes that the Finnish telemedicine and health IT, which emanates from the ICT aspects, are projected to gain more momentum and become increasingly visible into the future. This concept has been based on the promising nature and progressive achievements of the country's health system over the last few years. It has vigorously transformed its healthcare system.

It is also important to acknowledge that new technological innovations continue to emerge every other day. More research is being conducted in the healthcare sector, whereby increased implementation of technologies such as computerization of organizations has continued to replace human labour. This trend is also expected to grow further. Considering that Finland is ranked 3rd among the OECD countries has strong history of technical advancements, and has been allocating relatively huge budget in its healthcare sector. In view of the above, it is arguable that Finland will continue to absorb cutting edge technologies with progressive transformations and this will mean improved patient documentation management as well as effective facilitation of other information that relate to health care outcome.

6 ICT in Ethiopia

6.1 The Current State of ICTs in Ethiopia

Despite the early promise of ICT development in Ethiopia, it has largely foundered due to lack of connectivity. With an internet access rate of only 0.42% in 2008, Ethiopia has one of the lowest rates of Internet access in Africa (compared to an average of 5.34%) (Chekol, 2009.) According to the International Telecommunications Union's (ITU) Information Development Index (IDI), Ethiopia ranks #147 out of 159 countries in terms of information access and technology (Adam, 2010). There is only one internet provider (the state-owned monopoly Ethiopian Telecommunications

Corporation), and most people access the Internet through Internet cafes (Chekol, 2009). ETC is an ineffective monopoly and is overseen by a regulator that is seen as illegitimate and weak, reducing the public support for ICT services (Adam, 2010). This both limits access geographically (most cafes are in Addis Ababa) and in terms of access (which is slow and unreliable) (Chekol, 2009). It is clear that at least in terms of open access to citizens, Ethiopia lags far behind in its use of ICTs.

6.1.1 State of ICT Use in Healthcare in Ethiopia

Ethiopia has not been able to realize its full potential and is still struggling with major drivers of socio-economic development including its technological innovations. This is not withstanding the fact that the Ethiopian government has been setting aside 10% of its GDP for the ICT sector on an annual basis (Fleischmann & Srikantaiah, 2011, p. 3) It is important to note that the effective implementation and integration of health information systems largely depend on the financial ability of a country to acquire and adopt the changing technological environment. Unfortunately, this has not been the case with Ethiopia. According to Adam (2012, p. 4), Ethiopia was ranked at position 150 out of 155 countries in 2011 by the ICT Development Index. This is one of the indices that are used in the determination of a country's readiness with reference to the adoption of ICT and in which case three key measures are used (Chanyagorn, et al 2011, P 7-8.) Firstly, there is the determination of a country's readiness with reference to skills sub-index, involving ICT capability and in which case is determined by the gross secondary and tertiary enrolment as well adult literacy. Secondly, there is the infrastructure and access sub-index involving ICT readiness determined by the international bandwidth, household internet connectivity, mobile and fixed telephony, and those households with computers. Finally, there is the use of the ICT intensity sub-index, determined by indicators such as mobile broadband, internet users, and wired broadband. Based on these indicators, Ethiopia has performed really poor in the recent years Adam (2012, p. 4).
With reference to the above findings, it follows that the current Ethiopian status of ICT is unfavourable and is not well connected to the internet backbone.

7 The Prevailing Challenges

Firstly, there is the issue of the financial constraint. Although the Government of Ethiopia (GOE) has been committed to financing the ICT sector as well as its healthcare, the proportion of money allocated is still low considering the immense nature of the required improvement in the two sectors. Currently, the country is still struggling with many areas of socio-economic development including education, housing, and social welfare making it relatively challenging to import new technologies from other developed countries (Kebbede 2012 P.34-37.) Considering that some of the equipment used in the improvement of healthcare information systems use highly expensive technologies, it makes it unaffordable to most of the developing countries (Tan, 2005, p. 247). The alternative to such technological importation is the independent development of the particular technologies by the individual host countries (Tan, 2005, p. 247.) However, this has also been limiting factor to the Ethiopian government as it lacks the adequate financial resources to fund innovations as well as research and development (Shekar, 2012, p. 5). And these are the two central drivers to improving the health systems' infrastructure (Shekar, 2012, p. 5).

Secondly, there is the issue of educational status in the country, whereby a large number of the population remains uneducated (Asemahagn, 2015, p. 3). Ethiopia is still struggling with educational development and access since a huge proportion of the citizens are unable to afford education due to the country's economic status (Kebbede 2012 p.28.) or instance, issue of unemployment and poor labor pays are still rampant making it highly challenging for the parents and guardians to enroll their children in schools. Even in the events where school enrollment has been stepped up, cases of school drop-out still remain high explaining the reason why the number of graduates still remain low. Additionally, Ethiopian education system like in many other African countries is instructional in nature rather than adopting the inquiry-based learning (Kebbede 2012 p28-29.)herefore most of the graduating students do not possess the relevant skill set required for the infusion of requisite technical skills (Asemahagn, 2015, p. 3).

Thirdly, there is the problem of poor internet connection in Ethiopia, considering the fact that development of ICT technologies is largely reliant on the efficiency and stability of the prevailing

internet connections (Kebbede 2012 p.26).Data connection network companies are still scarce in the country implying that internet distribution costs are still high (Asemahagn, 2015, p.3).Additionally, the poor internet and data coverage in Ethiopia implies that a large number of the healthcare facilities are not connected to the internet. It also means that the current technological infrastructure is still too weak to support imported technologies (Kebbede 2012 p.26) For instance, most of the imported healthcare systems are highly reliant on the internet implying that its absence will derail their usage in the large number of healthcare facilities that are not connected to the network. According to Tan (2005, p. 247), the internet bandwidth in Ethiopia is very small.

Finally, Asemahagn (2015, p. 3) cites poor ICT awareness, poor computer access, and managerial problems as the other major setbacks to the integration of ICT in the Ethiopian healthcare system. The little knowledge about ICT, among the citizens, means that they are incapable of using it making it difficult to use the ICT systems in hospitals. Moreover, the computer illiteracy among the care providers also inhibits the implementation of the ICT systems in healthcare. According to Tan (2005, p. 247), the number of IT professionals in the healthcare sector constituted of only 0.3 of the entire healthcare staff. Although these were as per the 2005 statistics, not much progress has been made in the ICT sector implying that the number still remains low. Also, the poor ICT infrastructure means that appropriate bodies and agencies have not been set up in the country, to monitor and manage the ICT Sector. In other words, there are no strong professional bodies that can help manage the ICT access and utilization in the healthcare sector and also at the national level (Asemahagn, 2015, p. 3).

8 The Future Outlook

Just like in many other countries, GOE is increasingly embracing the concept of ICT and has made it one of its strategic priorities with regard to its developmental agenda. For instance, there is an already enforced ICT policy in the country, which is a clear indication of Ethiopia's commitment to

the advancement of its ICT. Major milestones are being made where the government is continuously pursuing the establishment of strong cooperation with the private sector in a move aimed at encouraging the progressive use of ICT across all the organizations, including in the healthcare sector. In addition, the GOE has continuously been focusing on the creation of a suitable environment that promotes foreign direct investments (FDI), which are also central to the ICT development and integration. Appropriate international policies and trade tariffs, in the country, have been well developed and are continuously supporting the ICT implementation process. Ethiopia, just like some other countries in Africa is increasingly appreciating the positive changes being brought about by the adoption of novel technologies in different organizations. For instance, there has been an increase in the number of mobile phone purchases in the country, which demonstrates that the Ethiopian population is increasingly embracing technology (Kebbede 2012 p 12.)
In the view of the above, it can be concluded that the adoption of ICT and its integration into the different Ethiopian sectors will largely bring major breakthrough. Although the country has not kept pace with the other developed countries such as Finland and despite the fact that the two are miles apart with regard to the adoption of the ICT in their individual healthcare sectors.
This research process does have some limitations. The first issue is that as a case study, it only applies directly to Ethiopia and Finland. As it reflects peculiarities and conditions that are not in place in any other country. In fact, this is particularly so, given the unique position of Ethiopia as one of the least-developed ICT environments in the world, moreover Ethiopia has a unique alphabetical latter which makes it even more difficult to adopt ICT in health care. In the other hand Finland is far and beyond in terms of ICT integration in health care and other sectors.

Conclusion

ICT has brought about major developments in different industries including in the healthcare sector. Although some challenges have been experienced as different countries try to progress their

ICT integration into their healthcare sectors, there are a wide range of benefits that have been realized including among others the improvement of the patients' knowledge levels, cost effectiveness, patients' safety, aversion of financial errors in the healthcare facilities, research and development, and of the green environment. With reference to the ICT application in the Finnish and Ethiopian healthcare sectors, the paper has established that Finland, as a member of the OECD countries, is still way beyond Ethiopia, which is a developing country. Finland has a well-established foundation of ICT knowhow as promoted by its technological-oriented company, Nokia. This foundation has helped the country in advancing its ICT infrastructure unlike Ethiopia, which is still grappling with basic socio-economic problems. Currently, Finland has well developed and stable patient information recording systems, which have eventually helped it appropriately document and manage the patients' data. On the other hand, the Ethiopian government has been setting aside huge budgetary allocations to its ICT and healthcare sectors but as per the current findings, the money is still insufficient to address the gaps being faced by the two sectors. Some of the other major challenges that have been cited as negatively affecting ICT integration into the Ethiopian healthcare system include poor educational standard, poor internet coverage, poor ICT awareness, ICT managerial problems, poor ICT infrastructure, and poor computer access in the country.

9 Bibliograpy

Adam, L. (2010). Ethiopia ICT Performance Review 2009//2010.

Adam, Lishan (2012). “what is happening in ICT in Ethiopia: A supply- and demand-side analysis of the ICT sector”, *Research ICT Africa*, (2012): 1-48.

Asemahagn, Andualem , Mulusew (2015). “Challenges of ICTs Utilization among Health Professionals: The Case of Public Hospitals in Addis Ababa, Ethiopia”, *SM Journal of Public Health and Epidemiology*, 1, no. 3 (2015): 1-6.

Burney Aqil, Mahmood Nadeem, and Abbas Zain (2010). “Information and Communication Technology in Healthcare Management Systems: Prospects for Developing Countries.”*International Journal of Computer Applications*, 4, no. 2 (2010): 27-32.

Charles A. Shoniregun Kudakwashe Dube and Fredrick Mtenz2010) Electronic health care information security, 110-112

Chekol, A. (2009). Ethiopia - 2009 Access to Online Information and Knowledge. Retrieved from

Cruz-Cunha, Maria, Manuela (2013). *Handbook of Research on Icts for Human-Centered Healthcare and Social Care Services*. Hershey: Igi Publishing,

E-health of Finland Check Point 2008 Päivi Hämäläinen, Jarmo Reponen and Ilka Winblad . Accessed (April 20.) http://www.julkari.fi/bitstream/handle/10024/79888/f5ca5a36-f2c6-4e94-ae95-a7b439b1169b.pdf;sequence=1

Enku, Kebede-Francis(2011). Global Health Disparities: Closing the Gap Through Good Governance.

Fleischmann, K. R., & Srikantaiah, T. (2011). SWOT analysis of mobile phones in four countries: Comparing india, Ethiopia, Kuwait and the United States. Proceedings of ASIST 2011

Global Information Society Watch: http://www.giswatch.org/country-report/20/ethiopia

Goel, Sonu (2014). *Textbook of Hospital Administration*. London: Elsevier Health Sciences APAC,

Guah, Matthew W (2011). *Healthcare Delivery Reform and New Technologies: Organizational Initiatives*. Hershey PA: Medical Information Science Reference,

Hanna, Nagy. *E-transformation (2010): Enabling new development strategies*. New York: Springer,

http://www.researchictafrica.net/publications/Policy_Paper_Series_Towards_Evidence-based_ICT_Policy_and_Regulation_-_Volume_2/Vol%202%20Paper%209%20-%20Ethiopia%20ICT%20Sector%20Performance%20Review%202010.pdf

Hyppönen, Hannele, Hämäläinen, Päivi and Reponen, Jarmo(2015). "E-health and e-welfare of Finland", *National Institute for Health and Welfare*: 1-155.

ICT Readiness Assessment Model for Public and Private

IGI Global, and Information Resources Management Association (2015). *Healthcare Administration: Concepts, Methodologies, Tools, and Applications*. Hershey, Pa: IGI Global.

IGI Global, and Information Resources Management Association (2018). *Health Care Delivery and Clinical Science: Concepts, Methodologies, Tools, and Applications*. Hershey, Pa: IGI Global.

International Congress in Nursing Informatics, Hyeoun-Ae Park, Peter J. Murray, and Connie White Delaney (2006). *Consumer-Centered Computer-Supported Care for Healthy People: Proceedings of NI2006, the 9th International Congress on Nursing Informatics*.

Int'L Business Publications (2015). *Finland Investment and Business Guide: Strategic and Practical Information*. USA: Intl Business PubnsUsa.

Marie-Pierre Gagnon, and José Côté (2015) Impacts of information and communication technologies on nursing care: an overview of systematic reviews (protocol)

Mistry of Health Ethiopia http://www.moh.gov.et/web/guest/fact-sheets Last modified 2016. Accessed February 22, 2018

Morley, Deborah (2014). *Understanding Computers in a Changing Society*. Australia : Delmar,

NATO Advanced Research Workshop on Benchmarking Telemedine(2017): Improving Health Security in the Balkans, and Carla Sydney Stone. *Benchmarking Telemedicine: Improving Health Security in the Balkans*. 2017. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1632344>.

Oqubay, Arkebe (2015). *Made in Africa: Industrial Policy in Ethiopia*. Oxford, United Kingdom : Oxford University Press.

Organizations in Developing Country. Pornchai Chanyagorn and Bundid Kungwannarongkun (2011) Accessed April 20.2018 http://www.ijiet.org/papers/17-E00048.pdf

Paula Ranta (2010) Information and Communications Technology in Health Care

Rodrigues, Joel(2014). *Advancing Medical Practice Through Technology: Applications for Healthcare Delivery, Management, and Quality*. Hershey, PA : Medical Information Science Reference.

Saba , Virginia, and McCormick, Kathleen(2011). Essentials of Nursing Informatics, 5th Edition. New York: McGraw Hill Professional.

Sirak Kebbede 2012. A methodology for the adoption of information systems in least developed countries (ldcs)

Tan, Joseph (2005). *E-Health Care Information Systems: An Introduction for Students and Professionals*. Hoboken: John Wiley & Sons.

Tan, Meera (2012). "ICTs for health in Africa", *e Transform Africa*, : 1-25.

Teperi, Juha, Porter , E, Michael, Vuorenkoski, Lauri, and Baron, F, Jennifer(2009). "The Finish Health Care System: A value based perspective", *Sitra Reports*, : 1-116.

Teperi, Juha, Porter E, Michael, Vuorenkoski Lauri, and Baron, Jennifer, F.(2009) "The Finish Health Care System: A value based perspective", Sitra Reports,

The National Institute For Health And Welfare(2018)"Health Expenditure and Financing - THL". *(THL), Finland*. Last modified 2018. Accessed January 26, 2018. https://www.thl.fi/fi/web/thlfi-en/statistics/statistics-by-topic/finances-in-the-health-and-social-services-sector/health-expenditure-and-financing.

Vainioma, Suva, Kuusel, Maisa, Vainioma, Paula, and Rautava, Paivi (2008). "The quality of electronic patient records in Finnish primary healthcare needs to be improved", *Scandinavian Journal of Primary Health Care*, 26: 117-122.

Vuorenkoski, Lauri (2008). "Health System in Transition", *Finland Health System Review*, 1-170.

Wang, James. Challenging (2013*) ICT Applications in Architecture, Engineering, and Industrial Design. Education*. Hershey, Pa: Engineering Science Reference.

WHO.Int, WHO.Int(2018). "WHO | Ethiopia". *Who.Int*. Last modified 2018. Accessed March 9, 2018. http://www.who.int/countries/eth/coop_strategy/en/index1.html.